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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/814,587

04/01/2004

Wilfried Ensinger

403034/HOEGER

5864

23548 7590 09/05/2008
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EXAMINER

MACARTHUR, SYLVIA

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

09/05/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/814,587	Applicant(s) ENSINGER, WILFRIED	
	Examiner Sylvia R. MacArthur	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6-22,27,28 and 30-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,6-22,27,28 and 30-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1,4, 6-22,27,28, and 30-32 have been considered but are moot due to the new grounds of rejection surrounding the limitation reciting the flange. It is noted that former claim 5 was inadvertently omitted in the previous rejections and thus the finality of the previous rejection is withdrawn.
2. The prior art of Jackson et al (US 5,643,061) recited a flange that is outwardly extending from the main body of the ring, see the abstract. Flange 29 and 93 are discussed as conventionally known and are used to provide a lower limit to the motion of the retainer, see col.3 lines 50-59. Furthermore, col.5 lines 30-35 recite that the flange is used to provide a damping action to any undulations (pressure variations) that may form at the outer edge of the retaining ring.
3. Likewise, the prior art of Kobayashi et al (US 5,584,751) teaches that a flange is used to support the weight of the carrier. see the paragraph that adjoins cols. 3 and 4.

Terminal Disclaimer (TD)

4. The terminal disclaimer filed on 8/13/2008 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US 6,913,669 has recorded, but at the time of this office action has not yet been reviewed by the USPTO personnel and thus can not be stated as "accepted". The status of the TD will be updated in the examiner's next response.

Claim Rejections - 35 USC § 103

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 8, 9, 20, and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga et al (US 6,251,215) in view of Katagiri et al (US 6,565,424) and Kobayashi et al (US 5,584,751) or Jackson et al (US 5,643,061).

Regarding claim 1: Zuniga teaches a retaining ring 110 to be fitted on a CMP apparatus for semiconductor wafers comprising: a carrier ring (upper portion 184) is formed of a rigid material while the (lower portion 180) according to col.5 lines 50-col.6 lines 67 is made of plastic. The carrier ring has fitting elements (bolts 194) fit the carrier ring to the polishing apparatus. Col. 5 lines 47 and 48 recite that the bearing ring and carrier ring are bonded with an adhesive layer 186. In col. 6 lines 45-49, connection via screw and press-fit are recited as alternative methods of attaching the bearing and carrier rings.

Zuniga et al fails to teach that the plastic material further comprises thermoplastic materials and an abrasive-reducing and/or wear-reducing additives.

The prior art of Katagiri et al teaches a method and apparatus of planarizing a semiconductor device wherein a retainer ring is provided that is constructed of a thermoplastic such as PEEK or PPS and rings coated with a polyimide see col. 5 lines 39- col. 6 line 14. The motivation to construct the retaining ring of Zuniga et al with the materials of Katagiri et al are

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the materials are low wear, prevents contamination, and wafer edge deformation does not occur see the recitation above. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining ring of Zuniga et al with the materials of Katagiri et al.

Furthermore, regarding the term “releasably attached”, this term has been given the broadest interpretation, of 1) adjustable and/ or 2) separable. According to *In re Stevens*, 212 F. 2d 197, 101 USPQ 284 (CCPA 1954), adjustability, where needed, is not given patentable advance. Additionally, according to *In re Dulberg*, 289 F. 2d 522, 523, 129 USPQ 348, 349 (CCPA 1961) (MPEP 2144.04 V C making separable), it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to construct the bearing ring and carrier ring separable for ease of assembly/disassembly for maintenance.

Zuniga et al teaches that the attachment of bearing ring to carrier ring takes place in the area of the outer circumferential surface (edge) of the bearing ring, see Figs. 2 and 3.

The combination of Zuniga et al and Katagiri et al fail to teach a flange.

The prior art of Jackson et al recited a flange that is outwardly extending from the main body of the ring, see the abstract. Flange 29 and 93 are discussed as conventionally known and are used to provide a lower limit to the motion of the retainer, see col.3 lines 50-59. Furthermore, col.5 lines 30-35 recite that the flange is used to provide a damping action to any undulations (pressure variations) that may form at the outer edge of the retaining ring.

Likewise, the prior art of Kobayashi et al teaches that a flange is used to support the weight of the carrier. see the paragraph that adjoins cols. 3 and 4.

It would have been obvious at the time of the claimed invention to provide a flange in the apparatus of Zuniga et al and Katagiri et al in order to provide a lower limit to the motion of the retainer, provide a damping action to any undulations (pressure variations) that may form at the outer edge of the retaining ring, and support the weight of the carrier.

Regarding claim 30:

Zuniga et al teaches a carrier head made of a retaining ring with an upper (carrier ring 184) and lower part (bearing ring 180). In col. 5 lines 50-67, Zuniga et al teaches that the bearing ring is made of plastic, while col. 6 lines 30-42 teaches that the carrier ring is made of metal.

The patent to Zuniga fails to teach how the metal used as the material of construction was formed. However, the limitation that the metal of construction was pretreated by metal spraying is a product by process limitation. The teachings of Zuniga are a retaining ring with a bearing ring made of plastic and a carrier ring made of metal the process used to form the metal does not structurally limit the product of the patent in view of Zuniga. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to produce a metal carrier ring using the process cited in claim 30 of the present invention.

Regarding claims 31 and 32: The patent held to applicant fails to teach the dimensions of claims 31 and 32 of the present invention. Zuniga teaches in col. 6 lines 29-42 that the thickness of the metal carrier ring is 300-500 mils and that the relationship with the bearing ring is that the thickness of the bearing ring is greater than the carrier ring. The thickness the layers used to form the carrier ring is a matter of optimization. The thicker the bearing ring the more time between replacements so the throughput of the polishing process is increased. It is the examiner's position

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that the thickness the layers used to form the carrier ring is a matter of optimization. According to *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1999), it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effect variable such as carrier ring thickness through routine experimentation in the absence of a showing of criticality. The motivation to construct the carrier ring of these dimensions is that the retaining ring will endure wafer processing without the need for frequent replacement due to fatigue. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to optimize the thickness of the bearing ring to extend the time between ring replacements.

7. Claims 1,4, 6-9,11-13, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeMeyer et al (US 2003/0070757) in view of Katagiri et al (US 6,565,424) and Kobayashi et al (US 5,584,751) or Jackson et al (US 5,643,061), also claim 15-17 for Jackson et al.

Regarding claim 1: DeMeyer et al teaches a method and apparatus for two-part CMP retaining ring. DeMeyer et al teaches a retaining ring for a carrier head, comprising a first rigid annular portion (carrier ring) and a second annular portion (bearing ring), see claim 1 of DeMeyer et al. DeMeyer et al further teaches that the second portion 25(bearing ring) is made of plastic, see claim 8 and [0022] of DeMeyer et al. Claims 10 and 11 of DeMeyer et al teach that securing means (fitting elements) are provided to secure the first portion 15 (carrier ring) to the carrier head (polishing apparatus). Claim 1 of DeMeyer et al further states that the first and second portions are screwed together which amounts a form of attachment that is release, non-rotatable with a positive and/or frictional connection, without adhesive. DeMeyer et al fails to teach that

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the plastic material further comprises thermoplastic materials and an abrasive-reducing and/or wear-reducing additives.

The prior art of Katagiri et al teaches a method and apparatus of planarizing a semiconductor device wherein a retainer ring is provided that is constructed of a thermoplastic such as PEEK or PPS and coated with a polyimide see col. 5 lines 39- col. 6 line 14. The motivation to construct the retaining ring of DeMeyer et al with the materials of Katagiri et al are the materials are low wear, prevents contamination, and wafer edge deformation does not occur see the recitation above. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining ring of DeMeyer et al with the materials of Katagiri et al.

Furthermore, regarding the term “releasably attached”, this term has been given the broadest interpretation, of 1) adjustable and/ or 2) separable. According to In re Stevens, 212 F. 2d 197, 101 USPQ 284 (CCPA 1954), adjustability, where needed, is not given patentable advance. Additionally, according to In re Dulberg, 289 F. 2d 522, 523, 129 USPQ 348, 349 (CCPA 1961) (MPEP 2144.04 V C making separable), it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to construct the bearing ring and carrier ring separable for ease of assembly/disassembly for maintenance.

DeMeyer et al illustrates in Figs. 1 and 2 that the releasable, non-rotatable, positive and/or frictional connection of bearing ring and carrier ring is made in the area of an outer circumferential surface of the bearing ring. See [0025] of DeMeyer et al.

The combination of Zuniga et al and Katagiri et al fail to teach a flange.

The prior art of Jackson et al recited a flange that is outwardly extending from the main body of the ring, see the abstract. Flange 29 and 93 are discussed as conventionally known and are used to provide a lower limit to the motion of the retainer, see col.3 lines 50-59. Furthermore, col.5 lines 30-35 recite that the flange is used to provide a damping action to any undulations (pressure variations) that may form at the outer edge of the retaining ring.

Likewise, the prior art of Kobayashi et al teaches that a flange is used to support the weight of the carrier. see the paragraph that adjoins cols. 3 and 4.

It would have been obvious at the time of the claimed invention to provide a flange in the apparatus of Zuniga et al and Katagiri et al in order to provide a lower limit to the motion of the retainer, provide a damping action to any undulations (pressure variations) that may form at the outer edge of the retaining ring, and support the weight of the carrier.

Regarding claims 4,7-9: Fig. 1B of DeMeyer et al illustrates this limitation.

Regarding claim 6: DeMeyer et al according to the abstract teaches that upper and lower portion having mating threads.

Regarding claim 11: See [0025] the inset anticipates a ring groove/recesses/channels.

Regarding claim 12: See Figs. 1 and 2 of DeMeyer et al.

Regarding claim 13: Rotation is hindered by the mating parts of the retaining ring.

Regarding claims 20-22: Sections [0025 and 0026] discuss this limitation the screw in this case obviates the bolt, as a bolt is a type of screw.

**Regarding claims 11 and 15-17: Jackson et al teaches ring grooves in Figures 9 and 10, see col. 5 lines 49-67. The motivation to provide the grooves is to assist in circulating, distributing, and mixing the slurry. Thus, it would have been obvious for one of ordinary

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skill in the art at the time of the claimed invention to provide ring grooves as taught by Jackson et al.

8. Claims 10, 11, and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga et al in view of *Katagiri et al* and Kobayashi et al (US 5,584,751) as applied in claims 1, 2, 8, 9, 20, and 30-32 above, in further view of Numoto et al (US 2002/0049030).

The teachings of the Zuniga et al in view of Katagiri et al discussed above.

The modification fails to teach:

Regarding claim 10 (circumferential collar), claim 11 (ring groove), and claims 15-17 (ring groove)

Numoto et al a wafer polishing device wherein a snap ring (collar/flange) is used as retaining ring attaching part. The motivation to modify the retaining rings of the *primary references of prior art* is to provide a means of attaching the ring to the polishing apparatus with ease without popping out of the carrier, see [004 and 0010]. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a snap ring to acts as a circumferential collar or flange by releaseably adhering the retaining ring to the polishing apparatus.

Regarding claim 14: The snap ring of Numoto causes a shrinking-in or shrinking-on process of joining the pieces of the retaining ring of *Zuniga*. The snap ring clamps down or shrinks the pieces together. The motivation to use the snap ring of Numoto is that it provides another process of non-adhesively and releasably attaching the retaining parts of Zuniga et al.

The teachings of Zuniga et al and Katagiri et al were discussed above.

The modification teaches a carrier head made of a retaining ring with an upper (carrier ring 184) and lower part (bearing ring 180). In col. 5 lines 50-67, Zuniga et al teaches that the bearing ring is made of plastic, while col. 6 lines 30-42 teaches that the carrier ring is made of metal.

The combined teachings of the Katagiri et al and Zuniga fail to teach how the metal used as the material of construction was formed. However, the limitation that the metal of construction was pretreated by metal spraying is a product by process limitation. The combination of Katagiri et al and Zuniga yields a retaining ring with a bearing ring made of plastic and a carrier ring made of metal the process used to form the metal does not structurally limit the product of the patent in view of Zuniga. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to produce a metal carrier ring using the process cited in claim 30 of the present invention.

Regarding claims 31 and 32: The patent held to applicant fails to teach the dimensions of claims 31 and 32 of the present invention. Zuniga teaches in col. 6 lines 29-42 that the thickness of the metal carrier ring is 300-500 mils and that the relationship with the bearing ring is that the thickness of the bearing ring is greater than the carrier ring. The thickness the layers used to form the carrier ring is a matter of optimization. The thicker the bearing ring the more time between replacements so the throughput of the polishing process is increased. It is the examiner's position that the thickness the layers used to form the carrier ring is a matter of optimization. According to *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1999), it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effect variable such as carrier ring thickness through routine experimentation in the absence of a showing of

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criticality. The motivation to construct the carrier ring of these dimensions is that the retaining ring will endure wafer processing without the need for frequent replacement due to fatigue.

9. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuniga et al or DeMeyer et al in view of *Katagiri et al* Kobayashi et al (US 5,584,751) or Jackson et al (US 5,643,061), as applied above, in further view of Chen et al (US 6,390,908).

The teachings of the prior art of Zuniga et al or DeMeyer et al in view of *Katagiri et al* were discussed above.

Regarding claim 27: The prior art of Zuniga or DeMeyer et al individually or in combination with *Katagiri et al* fail to teach a bearing ring is made of two layers or components.

The prior art of Chen et al in col. 4 lines 19-21 teaches that the bearing ring can have more than two layers. The number of layers used to form the bearing ring is also interpreted as a matter of optimization and depends upon the material of construction of the layers and polishing pad. The motivation to construct a multilayered bearing ring is that the optimal number of layers will be matched with the least replacements needed in order to maintain throughput of the polishing process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a multi-layered bearing ring to lessen the need for replacement due to wear and tear.

Regarding claim 28: Both combinations fail to teach a carrier ring is made of fiber-reinforced plastic material.

Chen et al teaches a retaining ring 22, which includes a bottom layer (bearing ring 34) and a top layer (carrier ring 36). The bottom layer is made of a plastic. The bottom layer

is made of a fiber-reinforced plastic and the top layer is made of a plastic with a different fiber used to reinforce it. Since the bottom is noted as a wear ring, it obviates the limitation of claim 1 wherein the top material of construction is more rigid than the bottom. The motivation to construct the bearing ring of a fiber-reinforced compound is that it can endure the physical stress of CMP which out the need for frequent replacement. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide fiber-reinforced material for the bearing ring of either Zuniga et al or DeMeyer et al.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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/Sylvia R MacArthur/
Primary Examiner, Art Unit 1792